

Virgin River Bridge (Harrisburg Bridge)
Spanning Virgin River on State Route 9
Hurricane vicinity
Washington County
Utah

HAER No. UT-59

HAER
UTAH,
27-HURIV,
1-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
Rocky Mountain Regional Office
National Park Service
U.S. Department of the Interior
P.O. Box 25287
Denver, Colorado 80225

HISTORIC AMERICAN ENGINEERING RECORD

HAER
UTAH,
27-HUR.I.V,
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Virgin River Bridge
(Harrisburg Bridge)

Location: Spanning Virgin River on State Road 9, between St. George and Hurricane, Washington County, Utah

UTM: 12/4115380/287380
Quad: Harrisburg Junction

Date of Construction: 1933-1934 (damaged by flood in 1990)

Builder: Reynolds Ely Construction Company of Springville, Utah

Present Owner: Utah Department of Transportation
4501 South 2700 West
Salt Lake City, Utah 84119-5998

Present Use: Vehicular bridge, presently not in use due to flood damage; to be replaced by a new vehicular bridge. Projected date of removal is winter 1990 or spring 1991.

Significance: The Harrisburg bridge is a four span, cantilevered, poured concrete bridge with an open spandrel arch over the Virgin River. It is one of three open spandrel concrete bridges remaining in the State of Utah. The bridge was constructed by the Reynolds Ely Construction Company of Springville, Utah. The bridge provided more direct access to Zion National Park and other points of interest in southern Utah and northern Arizona. The increase in tourist traffic proved to be an economic boost to the economies of the town of Hurricane and other small communities of the region.

Historian: Jonathon C. Horn
Alpine Archaeological Consultants, Inc.
August 1990

I. HISTORY

A. Need for the Bridge

Few places in the continental United States are as geographically isolated as the communities of south-central Utah and north-central Arizona. Bound by deeply incised canyons including the Grand Canyon to the south and Bryce Canyon and Zion to the north, the region was sparsely settled by early Mormon immigrants beginning in the 1850s and 1860s. This separation and isolation was most acute for the communities of Hurricane and La Verkin in eastern Washington County, Utah, since they were economically and politically dependent on the larger towns of St. George and Cedar City. The main barrier separating the eastern portion of Washington County from the western part was the Virgin River. It was extremely difficult to export agricultural products out of the region as well as to bring needed supplies in. Those wishing to make additional money by working outside the area found the way torturous and hazardous. Consequently, western Washington County prospered, while the eastern portion of the county languished in relative poverty. [1]

Although the need for improved roads in and out in eastern Washington County was realized long before, it was not until the advent of the automobile and a nationwide fever for building new roads and highways in the early 1910s that any actions were taken. The affordability of automobiles quickly resulted in the ability for large numbers of people to travel. Rather than be constrained to areas serviced by railroads, this highly mobile population desired to visit areas previously unavailable to them. Conversely, communities that previously saw little tourism sought to attract tourists and their dollars by promoting themselves and the natural wonders surrounding them. Good roads were rightfully believed to be a major element in attracting visitors.

The first attempts to improve roads in the region emanated from east of the Virgin River. C. B. Petty of Hurricane and David Rust of Kanab began using convict labor to improve roads in the region in 1913. The following year, a convention was held in Hurricane to discuss the importance of tourism to the region and the necessity of good roads. The result of the meeting was the organization of the Grand Canyon Highway Association, intent on promoting and providing good access to the marvels of the north rim of the Grand Canyon for tourists. Using convict labor, they constructed the Arrowhead Trail (Highway 91) connecting Cedar City to the Grand Canyon by way of Kanab. Although originally planned to pass through Hurricane, the town was bypassed. [2]

In the ensuing years, the scenic wonders of the area were thrust farther into public view. Zion National Monument had been established in 1909. When its boundaries were expanded and its status upgraded to a national park in 1919, fewer than 1,000 names had been entered in the guest book. Nearby Bryce National Monument was established in 1923, becoming Bryce National Park in 1928. [3] The economic opportunity of having these major attractions nearby further intensified the desire of the communities of Hurricane and La Verkin to be connected by good roads to St. George. Attempts by local elected officials to the State Senate and House of Representatives for new roads were thwarted. However, a road connecting Hurricane with the Harrisburg Bench was proposed as part of the revised state road system in 1927. [4]

Washington County was particularly hard hit by the Great Depression of the 1930s. The already poor economy of the area was devastated beyond the means of local government relief programs. Federal relief was quickly sought. [5] The Emergency Relief and Construction Act of 1932 made federal funds

available to state governments for the construction of roads or other worth projects. This was intended to not only make needed improvements but to stimulate local economies with a demand for labor, materials, and supplies.

One of the projects that the county commissioners sought federal monies for, in 1932, was the construction of a road from the Harrisburg Bench to Hurricane and La Verkin, including the Harrisburg Bridge. Besides the shot in the arm that the project would give the local area from the construction alone, the county commissioners were expecting that it would result in an expansion of tourism to Zion National Park from California and Nevada, thereby providing long term economic benefits to the region. [6]

B. Construction Chronology

Apparently, initial word that funding would be provided for the construction of a road from the Harrisburg Bench through Hurricane to La Verkin, including a bridge over the Virgin River, was received from the Federal Government in 1932. Construction of the bridge and an 11.74 mile gravel highway were considered separately funded projects. Plans for the Harrisburg Bridge (FA 113-B) were approved on March 14, 1933, by the Utah State Road Commission's Chief Bridge Engineer, W. Hauscroft, and by District Engineer B. J. Finch, on April 26, 1933. [7] In response to questions raised by Mr. Finch, Chief Engineer for the Utah State Road Commission, H. S. Kerr, wrote that two approach spans were seen as necessary on the west end of the bridge to allow debris to pass below when the river flooded. "A minimum number of piers is desirable.... We considered the use of a three-span approach but in our opinion, the two span had such an improved appearance for the structure in general that any slight additional cost that might ensue is fully justified if appearance is worth anything." [8] It is interesting to note that, even in those economically hard times, aesthetics were considered worthy of a little more expense.

On July 19, 1933, a notice to contractors was released, requesting bids for a concrete arch bridge across the Virgin River. [9] Award of the contract went to the lowest bidder, Reynolds Ely Construction Company of Springville, Utah, on August 3, 1933, and the contract and bond were approved by the State Road Commission on August 16, 1933. [10] Funding was provided by the National Industrial Recovery Act of June 16, 1933, in the amount of \$34,071.75. [11] The lowest bid for the contract was 430,974.32. [12]

Construction began August 28, 1933. [13] Work progressed on schedule, until the evening of December 13, 1933, when heavy rains produced a flash flood. The shoring supporting forms for the main span over the Virgin River were washed away, resulting in the loss of 300 cubic yards of concrete, 50,000 board feet of lumber, and 25,000 pounds of reinforcing steel. Much of the steel was salvageable, however. Prior to the flood, sixty percent of the bridge had been completed. Direct loss and structural damage, as a result of the flood, left only twenty percent of the bridge intact. [14] Forging ahead after the disaster, the bridge was completed on March 24, 1934, with no apparent cost overruns. [15]

C. History of the Bridge After Completion and Its Future

Even before the bridge was completed, the town of Hurricane began planning a celebration. State Senator David Hirschi of Hurricane wrote the State Road Commission to thank them for constructing the bridge and for putting the town of Hurricane "in touch with the rest of the world, direct traffic

into Zion National Park, and shorten[ing] the east and west transcontinental traffic materially...." [16] On March 22, 1934, The Washington County News reported that routing of tourist traffic through La Verkin and Hurricane was expected to be very important to the economy of those towns. The bridge was dedicated on Saturday, March 24, 1934, followed by a banquet and dance in Hurricane. [17]

The Harrisburg (Virgin River) Bridge forms the crossing of State Road 9 over the Virgin River, connecting the town of Hurricane to the city of St. George by way of Interstate 15. State Road 9 is heavily utilized as the primary access route to Zion National Park and is used to some extent by travelers to Bryce Canyon National Park and Lake Powell. The bridge was in use for nearly 55 years when, in the early morning of January 1, 1989, the south dike of Quail Creek Reservoir gave way, washing out the west entrance of the bridge, depositing large quantities of debris on and around the bridge, and causing considerable structural damage. A temporary metal bridge was emplaced immediately downstream of the damaged structure, so that State Road 9 could be put back into service. An entirely new bridge across the Virgin River is planned when State Road 9 is widened to four lanes. This will entail removal of the historic Harrisburg Bridge.

D. The Reynolds Ely Construction Company

The Reynolds Ely Construction Company of Springville, Utah, were bridge and road contractors of long standing and excellent reputation. The company began as H. T. Reynolds and Co., a railroad construction contractor, possibly as early as the 1890s. Its founder, Henry T. Reynolds, was a prominent member of the community. Born in Springville on March 11, 1860, he became a successful merchant, owning a general merchandise establishment known as H. T. Reynolds Mercantile. He was also a city councilman and county commissioner, as well as founder, first vice president, and later president of the Springville Banking Company. Reynolds was reported to have "also done a vast amount of railroad contracting. [18] This included work on railroads from Nevada to Nebraska, including the line up Spanish Fork Canyon near Provo, Utah. [19]

During the 1920s, the company turned its expertise toward automobile road contracting. In the early 1920s, Reynolds bought the Ely Construction Company of Ely, Nevada, in order to gain the expertise of several key members of that organization. As a result of that purchase, the company was thereafter known as the Reynolds Ely Construction Co. [20]

When H. T. Reynolds died in 1928, his son, Henry T. Reynolds, Jr. (known as Harry), continued with the business. The company conducted numerous projects connected with the development of Bryce and Zion National Parks, including road surfacing and bridge construction. Among their most notable jobs were construction of two large stone bridges in Zion National Park. When the initial contractor was bankrupted by the construction of the Zion Canyon Tunnel, the Reynolds Ely Construction Company stepped in and completed the project, having to overcome numerous geologic difficulties in the process. This was the largest construction project carried out in Utah to that time. The construction of the Virgin River Bridge was one of the company's smaller undertakings. [21]

The prestige of the company is exemplified by the fact that H. T. Reynolds, Jr. was elected president of the Inter Mountain Branch of the Associated General Contractors of America in 1934, of which he was a founding member. [22]

The Reynolds Ely Construction Company continued in operation until 1952, when H. T. Reynolds, Jr. died. His son, H. Taylor Reynolds, continued with other family businesses, such as the Kolob Lumber Company, and served in the management of the Springville Banking Company, but did not pursue the road contracting business. [23]

E. Other Names for the Bridge

The Harrisburg Bridge is known by several other names. The most common, and the one that is found in the records of the Utah department of Transportation, is the Virgin River Bridge. Other names referring to the bridge in the literature are the Rio Virgin Bridge and the Berry Springs Bridge.

II. **ARCHITECTURAL INFORMATION**

A. Physical Description

The Harrisburg Bridge is a cantilevered three-span concrete arch bridge. It is constructed entirely of poured reinforced concrete. It has two arches with enclosed spandrels on the west approach, set on the floodplain of the Virgin River. Two spans form the east approach of the bridge as well. A single open spandrel arch spans the Virgin River. This is connected to the basalt flow of the Harrisburg Bench by a short enclosed spandrel arch. The bridge is 280 feet 6 inches long with a 24 foot wide running surface, widening to just under 26 feet on the west approach to allow for a 7 degree curve to the north on the two west approach spans. The two enclosed spandrel arches on the west approach are 66 feet 6 inches and 67 feet in length, respectively. The open spandrel arch of the east approach is 107 feet long, with the span connecting to the Harrisburg Bench being 20 feet long.

Guard rails run along both sides of the bridge and flare out slightly at the two entries. These guard rails have a stepped base on which the railing sits and a stepped cap that is slightly rounded on top. The railings have regularly spaced, simple arcaded portals along their entire lengths, except at the entries and the junctions of the underlying spans where plain, rough finished panels rest on the stepped base and project above the adjacent railing with flat, stepped caps. Several sections of the guard rail have been repaired and one section has been replaced. All conform to the original construction. A metal guard rail strip has been added on the south side of the west bridge entry. This was partially torn loose by the flood. Regularly spaced drain holes are present on both sides of the running surface of the bridge, adjacent to the guard rail. These are 4-inch iron pipes set vertically through the concrete running surface. At the bed level on the outside of the guard rail, on the south side of the west entry, "VIRGIN RIVER 27-96-1-1" is painted in black letters.

The two spans forming the west bridge approach are composed of three parallel arches each. The arches are rectangular in form, with plain recessed panels above enclosing the spandrels. Between the spans are two regularly spaced non-bearing partitions. Plain rectangular tapering concrete pillars are present at the west end of the bridge. The pillars at the junction of the west approach spans also taper and are stepped, and have decorative beveled imposts. The pillars also have decorative beveled joints running through their upper lengths, giving the appearance of paired rectangles stacked end to end. The pillars on either end of the open spandrel arch are more massive than the other pillars described thus far. These have tall stepped bases and are divided vertically by decorative joint, giving the appearance of two rectangular pillars side by side. The outside pillars on the west end of the open spandrel arch is set on large, 10-inch diameter steel rollers between 2-inch-thick iron sheets set on

concrete piers. The center pillar is unsupported from below. The decorative open spandrel arch consists of two parallel arches, rectangular in form. Rectangular pillars are regularly spaced across atop the arch supporting arches of their own below the roadbed. The pillars have bases somewhat larger than themselves with two tiered rectangular imposts supporting simple, half round arches. The pillars continue up between the arches to support projecting cross-members that in turn support the running surface of the bridge. The projecting ends of these cross-members angle up slightly on their lower edges. The concrete headwall abutting the basalt cliff of the Harrisburg Bench is flat with a decorative impost supporting the plain arch of the short easternmost span. All of the visible exterior surfaces of the bridge are smooth finished except for the recessed panels of the enclosed spandrels and guard rails, giving contrast to the bridge's appearance with a rough, pebbly texture. In addition, all sharp corners are beveled, giving the bridge a very finished appearance.

B. Modifications and Flood Damage

As is apparent from the architectural description of the bridge above, the Harrisburg Bridge remained virtually unmodified through its life. The only addition to the bridge was a metal guard rail on the south side of the west bridge entrance. The only repairs to the bridge appear to have been to the guard rails, probably as a result of damage by automobiles. These repairs duplicated the original appearance of the bridge and are noticeable only because of differences in concrete color and texture.

Damage to the bridge from the Quail Creek Reservoir flood of January 1, 1989, resulted in the removal of the roadbed leading to the west entry of the bridge. The northwest end of the bridge has settled somewhat, resulting in a twisting of the road surface, indicating that the bridge foundation on that end was undermined or destabilized as well. The other bridge spans appear to be relatively undamaged.

III. REFERENCES

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Reynolds, H. Taylor. Springville, Utah. Telephone interview, October 30, 1990.

Reynolds Ely Construction Company. "Utah State Road Commission Proposal Specifications, Contract and Bond for Construction of Highway in Washington County, Virgin River Bridge, N.R.H. Project No. 113-B, July 10, 1933." Utah Department of Transportation, Salt Lake City.

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B. Secondary Sources

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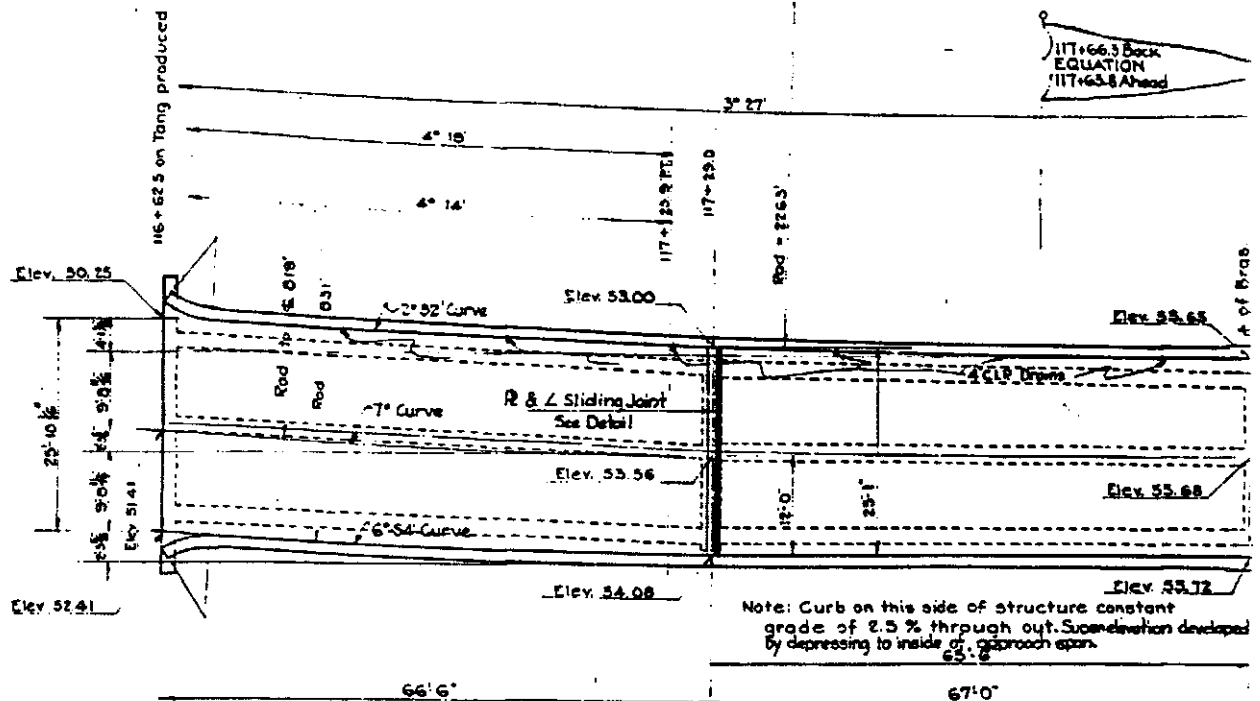
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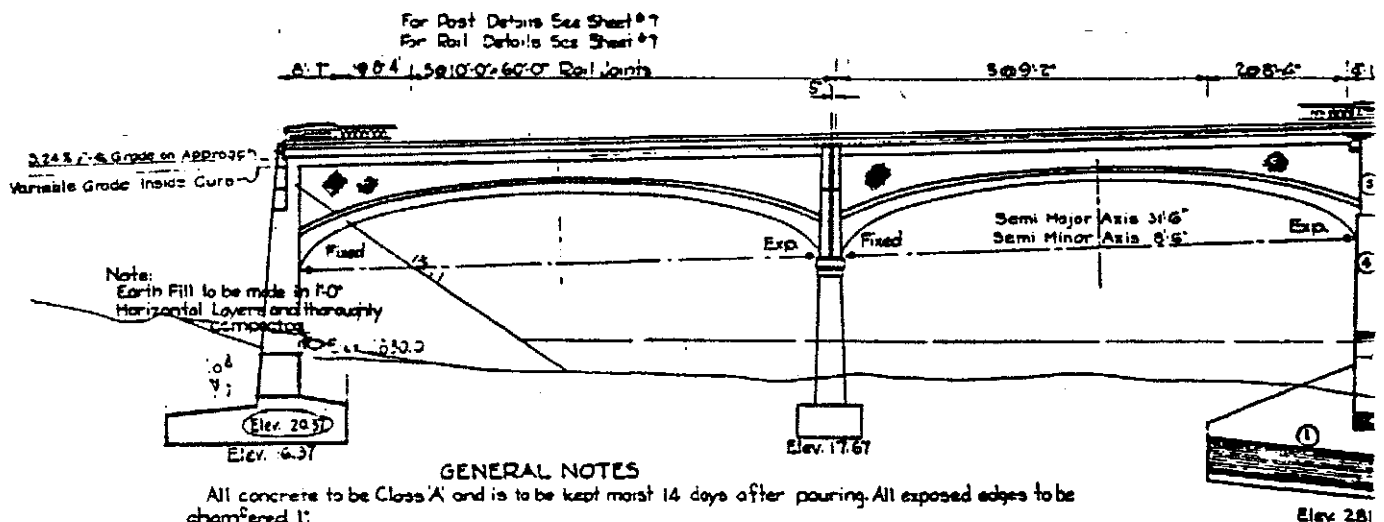
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HAER No. UT-59
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Melbo, Robert Irving. Our Country's National Parks, Vol. 1. New York: The Bobbs-Merrill Company, Inc., 1964.

Washington County News (St. George, Utah), March 22, 1934, and March 29, 1934.



PLAN



GENERAL NOTES

All concrete to be Class 'A' and is to be kept moist 14 days after pouring. All exposed edges to be chamfered 1".

Reinforcing Steel to be deformed bars, overlapped not less than 40 diameters at all splices, secured against displacement by wiring at all intersections with No. 16 iron wire and shall have a minimum of 1" clear cover of concrete. Bar diagrams are not drawn to scale and those bars not detailed are either straight or field bent, all dimensions are to be of bar unless otherwise shown.

All reinforcing steel shall fulfill the requirements of A.A.S.H.O. Specifications.

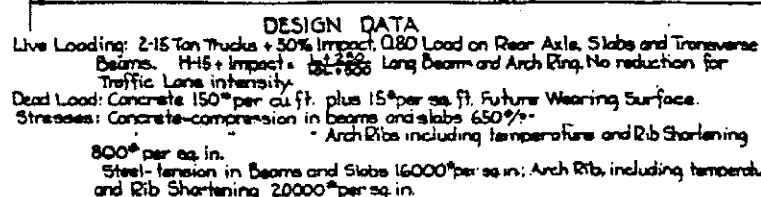
Permissible construction joints are shown on the plans, joints are not allowed between flange and stem of T-beams unless shear keys are formed in tops of beams.

Contractor shall verify steel schedules and any errors or omissions therein shall not be cause for adjustment in unit price.

Contractor to furnish all materials.

ELEVATION

FORM 1040 REV. 10-67	00000	NEW PAGE NO.	000000 PAGE	000000 PAGE	000000 PAGE
12	UTAH	1158			



Structure Ex.	625 Cu. Yds.
Concrete Class "A"	1108 Cu. Yds.
Cement	6981 Sacks
Rein. Steel	190150 Lbs.
Concrete Class "A"	112 Cu. Yds.
Cement	7006 Sacks
Reinforcing Steel	110000 Lbs.

As Constructed Quantities shown in Rec

UTAH STATE ROAD COMMISSION
SALT LAKE CITY, UTAH
K. S. Bates C. J. Williams

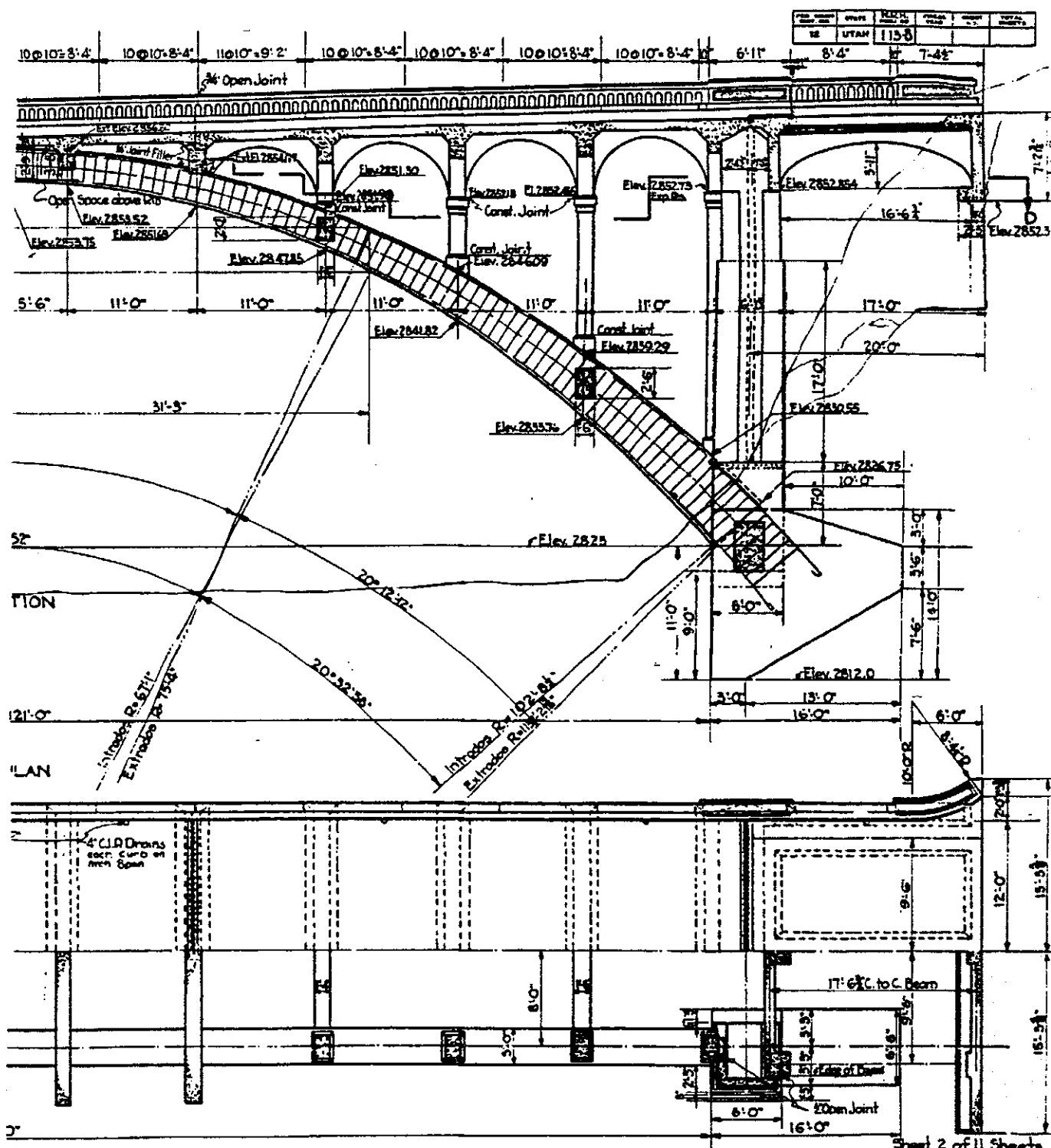
VIRGIN RIVER BRIDGE
280' 6" W.O. 12' CONC. ARC
+20' 1.66' 6" 1-67' 0" APPX. SPAN
Sta. 118+97 N 2 H 113
Horrifyingly Poor - No more water.

APPROX. 1910-0
DRAWN BY: J. A. W. SCALE: 1" = 100' 0"
CHECKED BY: J. A. W. DATE: 11/20/66
BRIDGE NO. 7 C.R. NO. D-352

(page 11)



Virgin River Bridge
(Harrisburg Bridge)
HAER No. UT-59
(page 12)



SECTION D-D

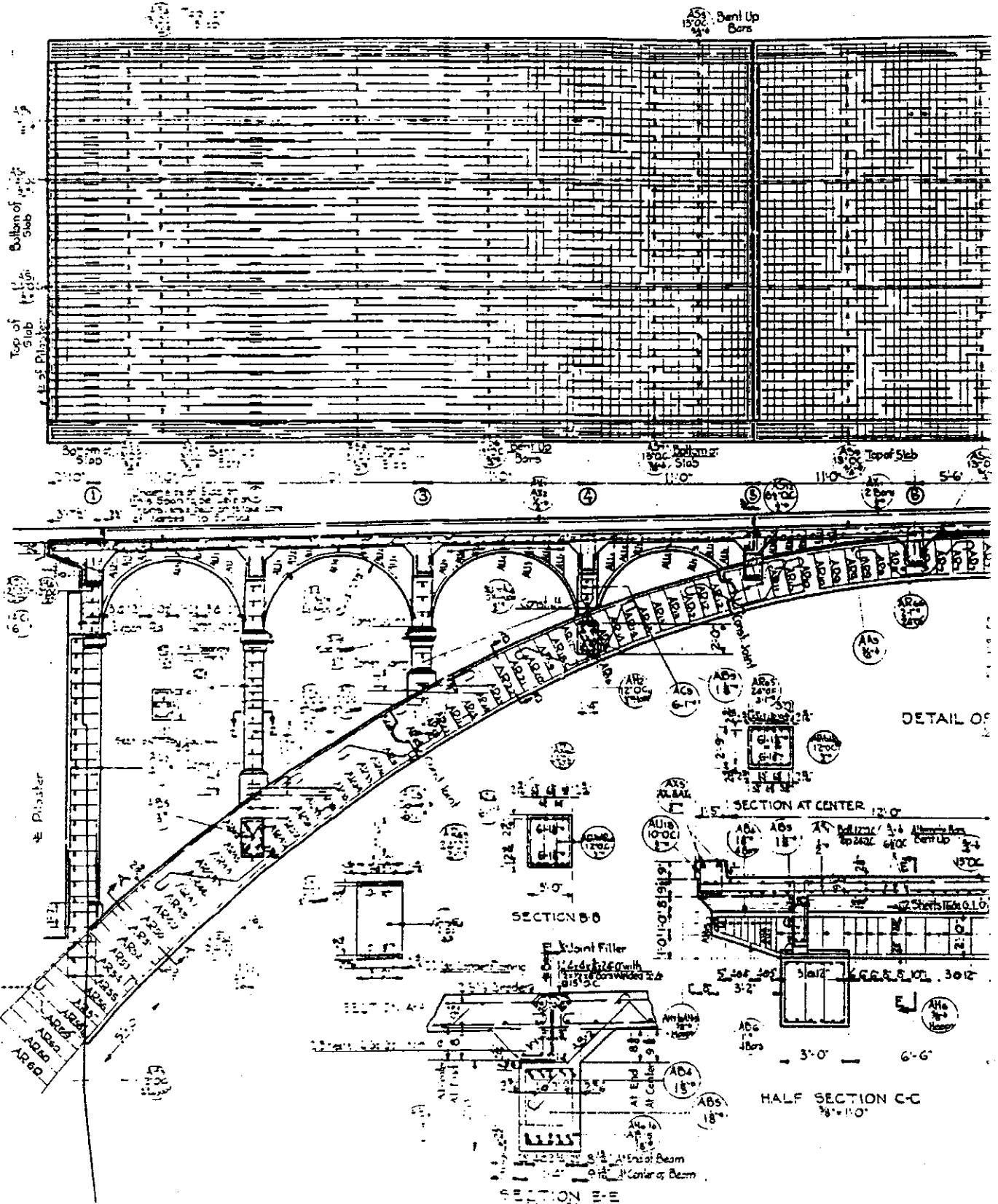
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SALT LAKE CITY - OFFICE
H. G. Nelson George Buchanan

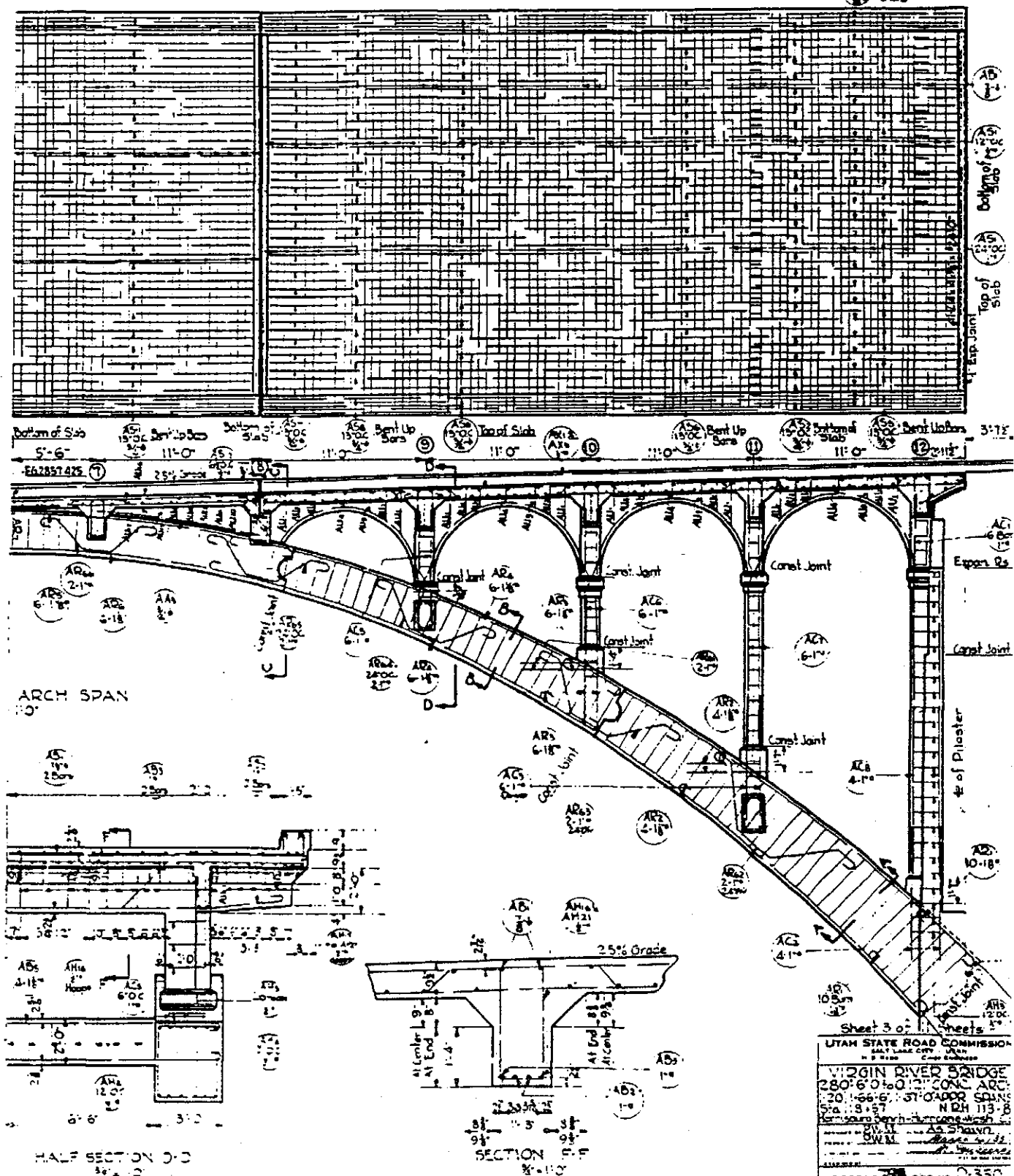
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280'-6" O.B. @ 0.12% CONC. ARCS
1-20' + 66'-6" + 67'-0" ADJ. SPAN
Sta. 118+51 N2E L113-
Normanburg Ranch-Hurricane Marsh

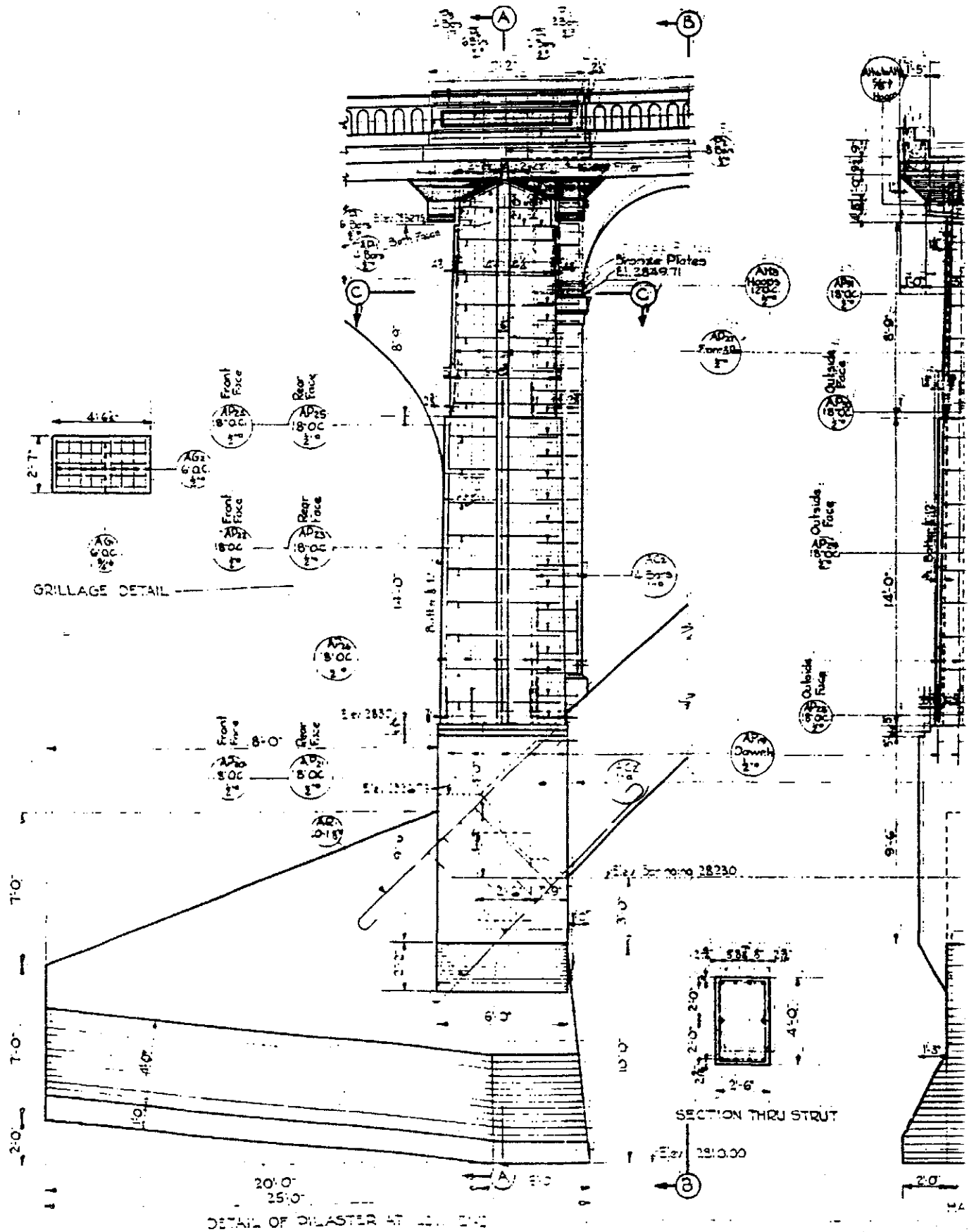
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Checked by: [Signature]
Designed by: [Signature]
Reviewed by: [Signature]

BRIDGE NO. 0-350

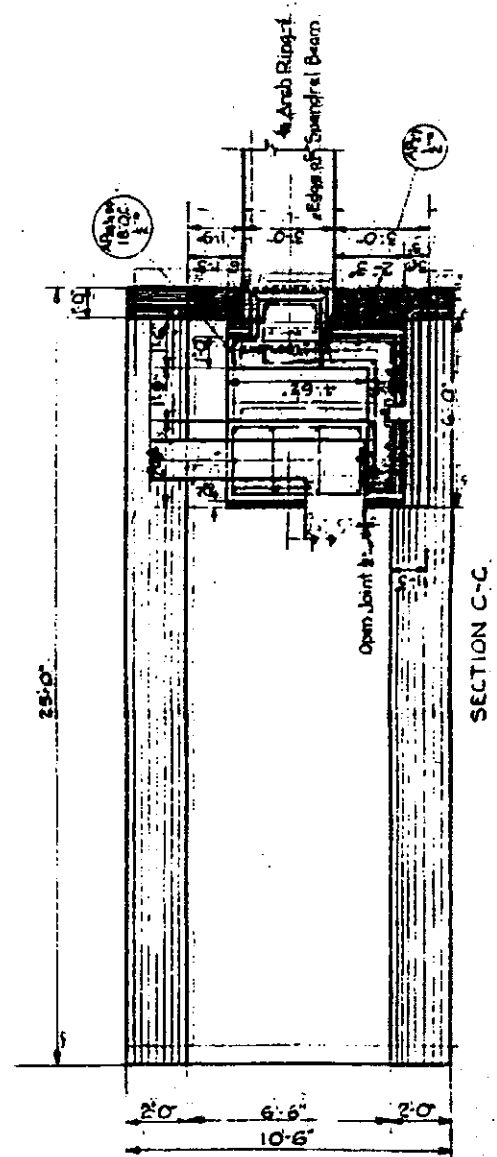
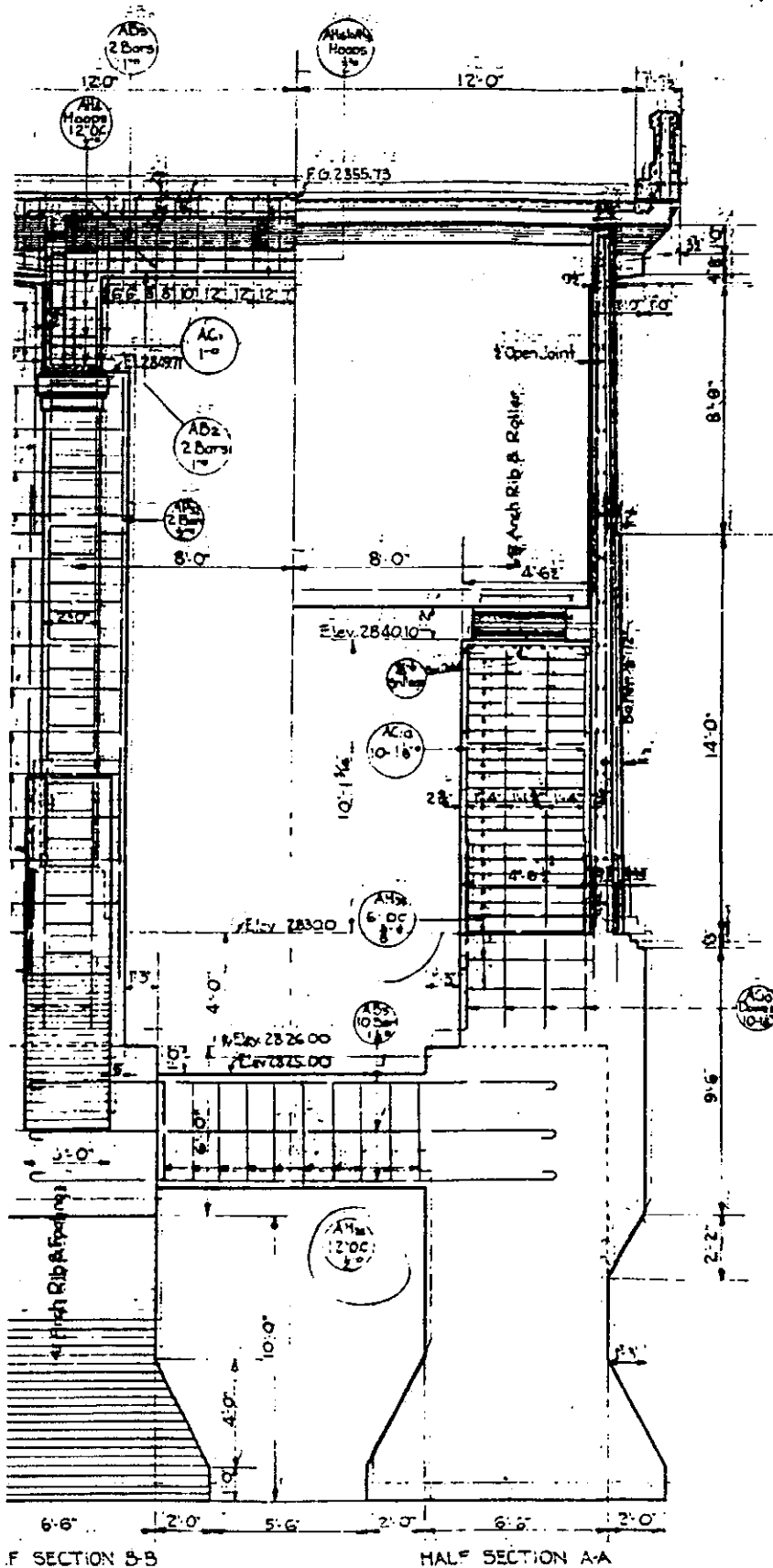


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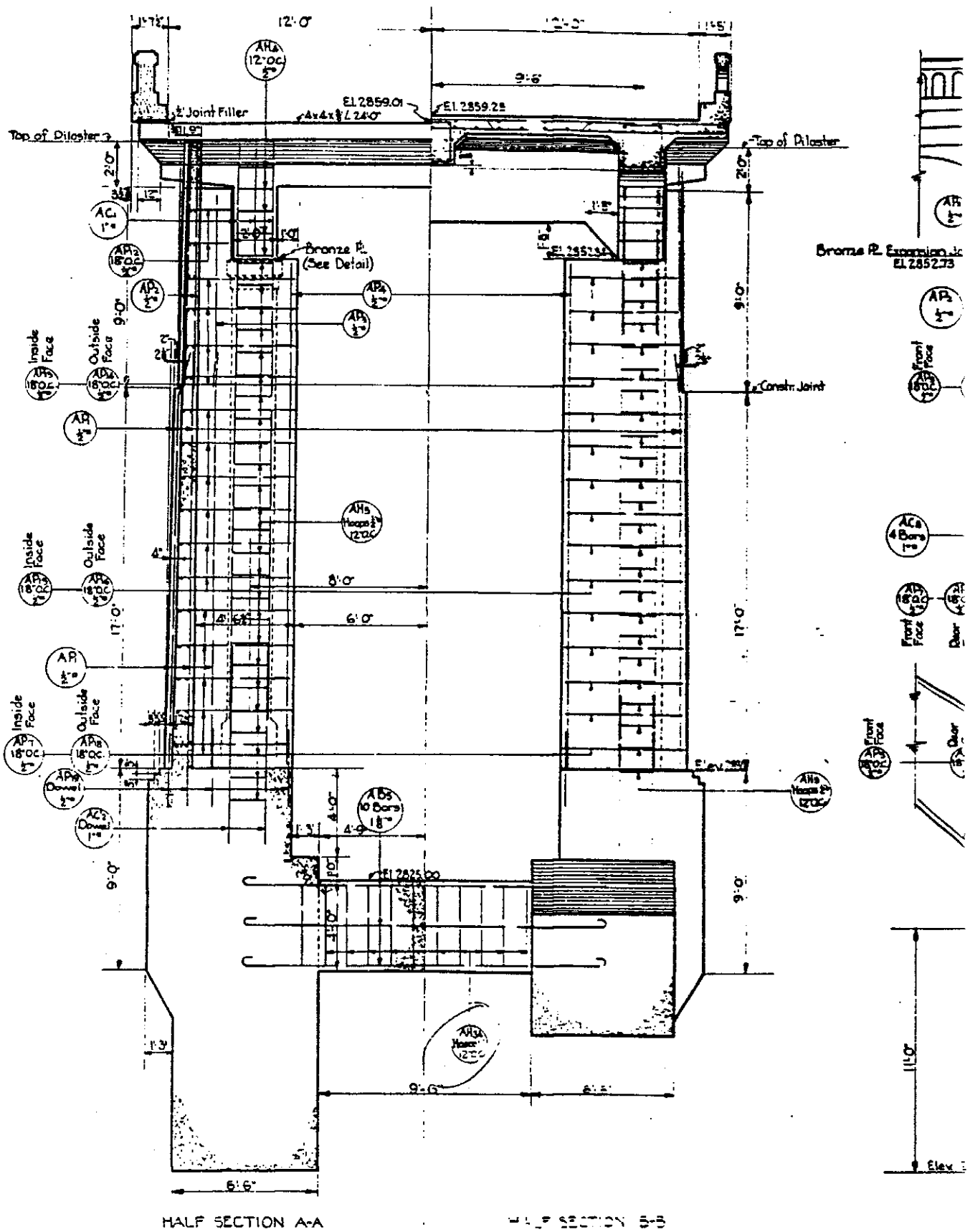


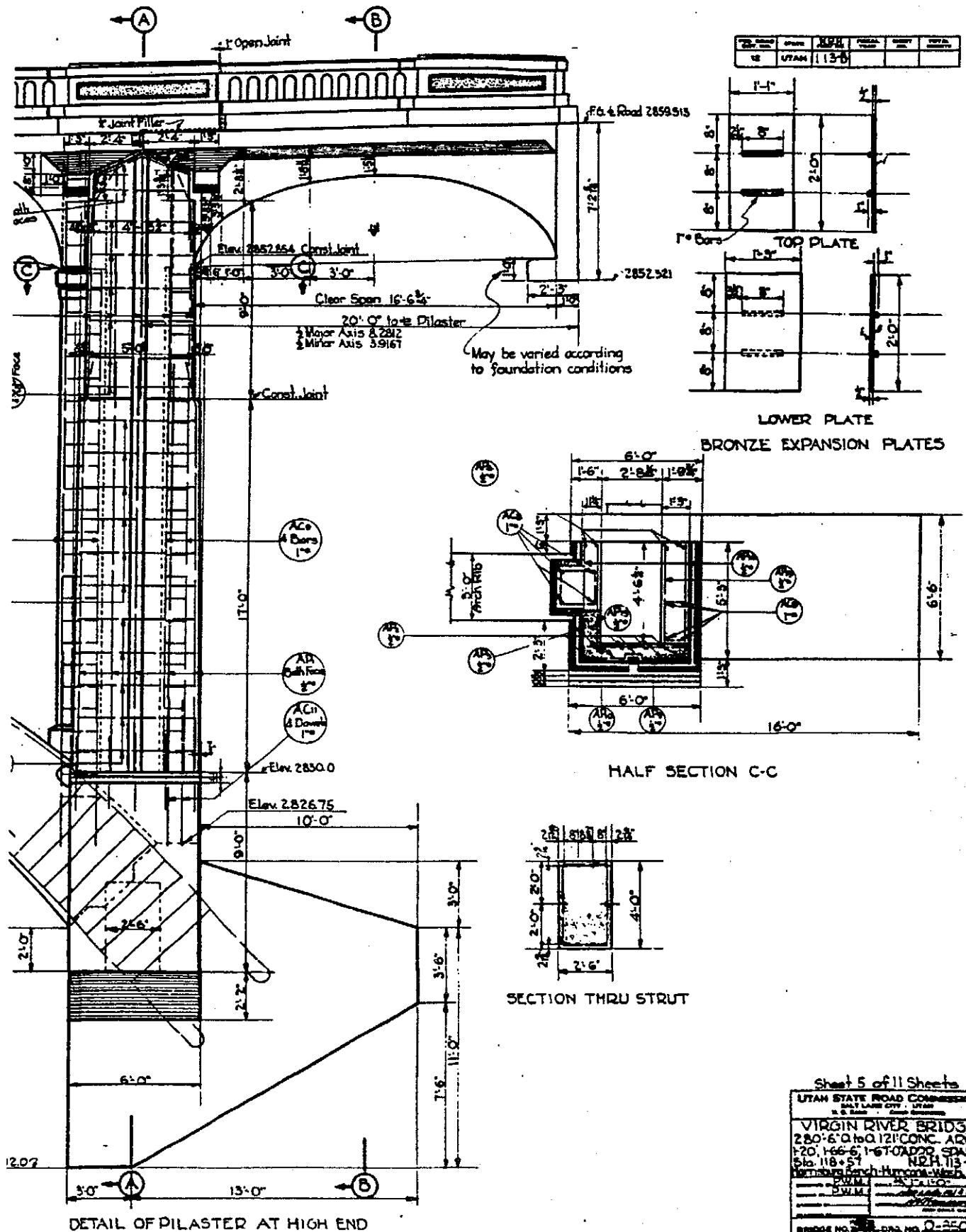
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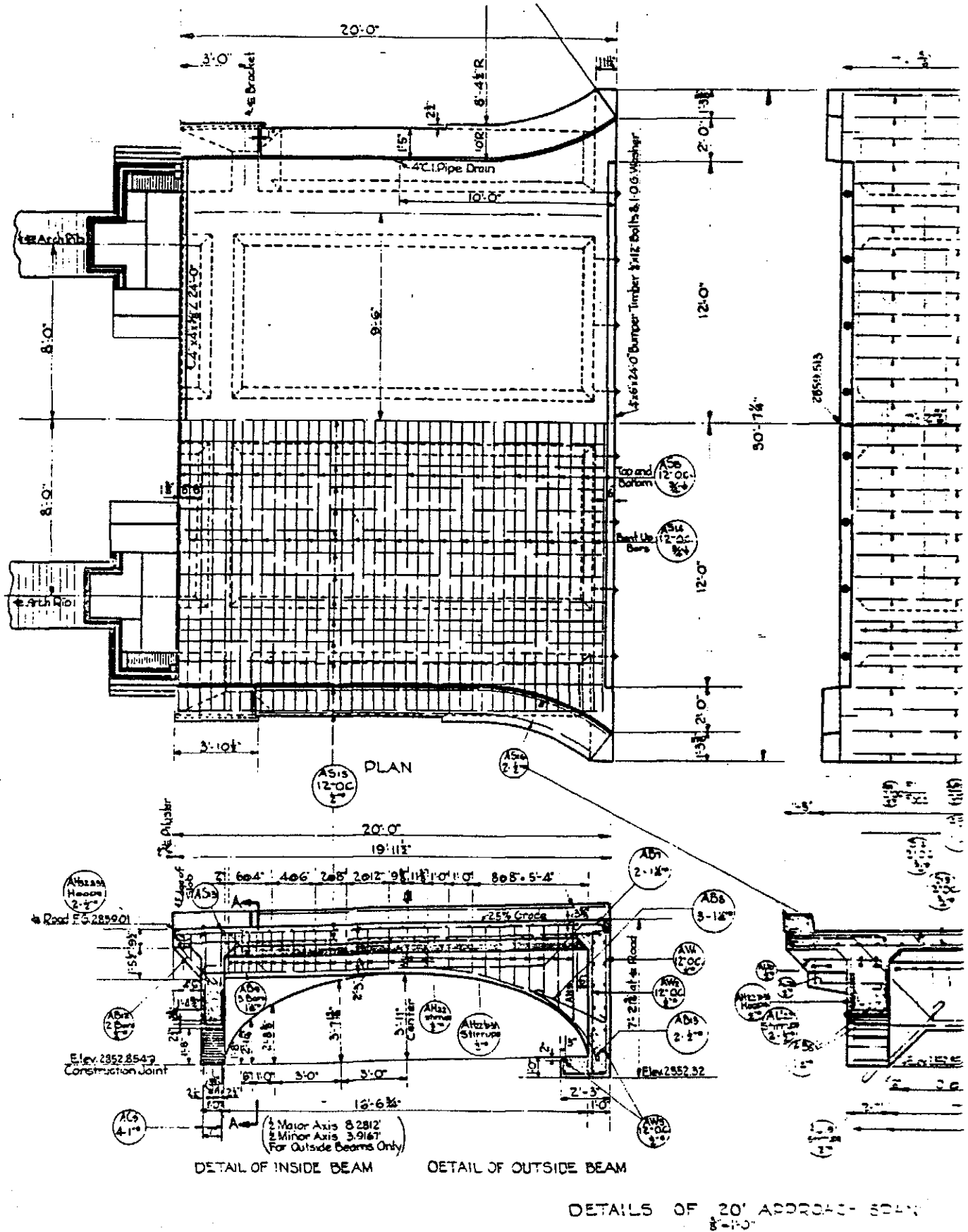


Sheet 4 of 11 Sheets
UTAH STATE ROAD COMMISSION
SALT LAKE CITY, UTAH
10 S. Main Street
VIRGIN RIVER BRIDGE
280'-6" O.C. 12" CONC. ARC.
20' - 66'-6" JAPPO SPAN
Sta. 118+51 N.R. 113-8
DESIGNED BY: [Signature]
CHECKED BY: [Signature]
BRIDGE NO. 113-8 Dwg. No. 2-350

Virgin River Bridge
(Harrisburg Bridge)
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(page 17)

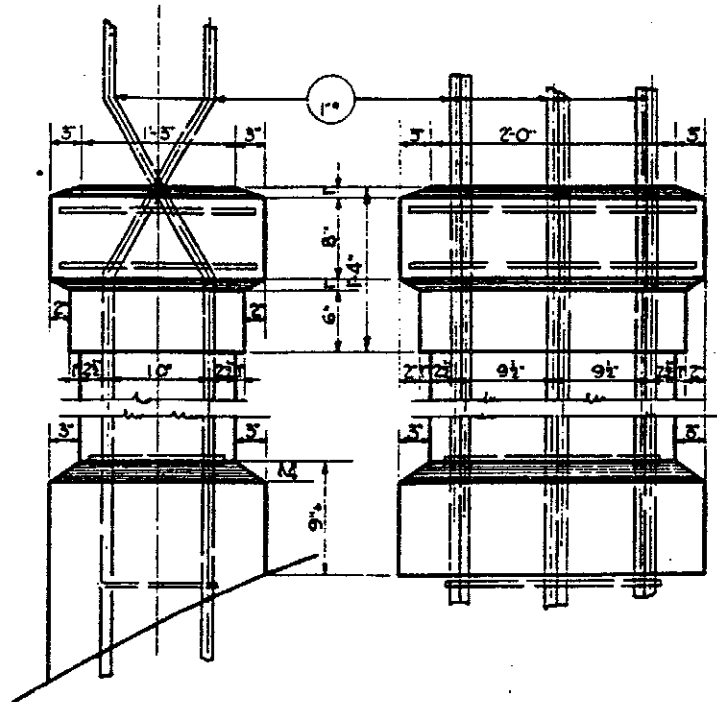
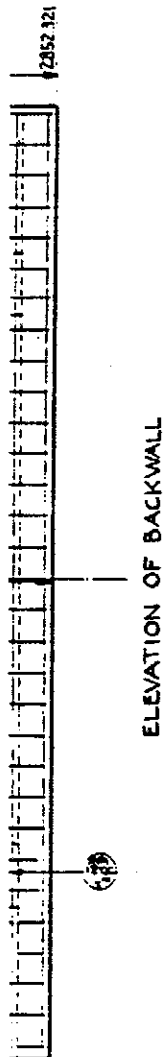




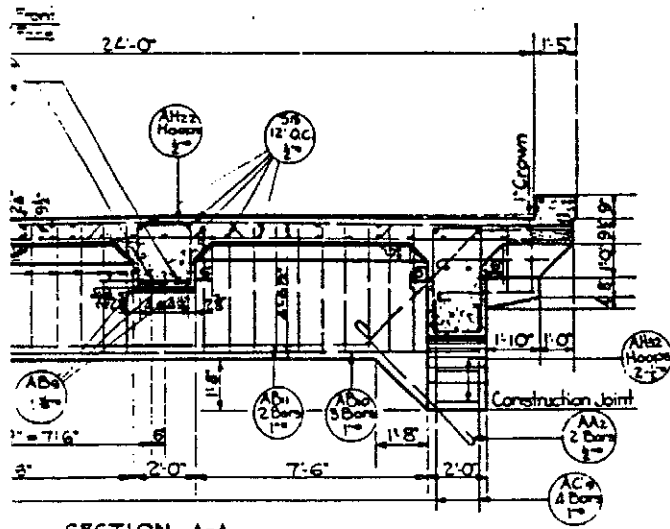


Virgin River Bridge
(Harrisburg Bridge)
HAER No. UT-59
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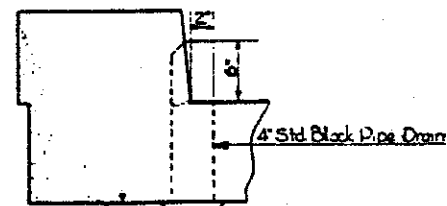
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TYPICAL SPANDREL COLUMN DETAIL
1/2" x 1" 0"



SECTION A-A



DRAIN DETAILS
12'-10"

Sheet 6 of 11 Sheets

UTAH STATE ROAD COMMISSION
SALT LAKE CITY, UTAH

H. G. Kaper - *Senior Executive*

VIRGIN RIVER BRIDG

1-280-6 0 100 121 CONCL. AD.
1-30' 1-66'6" 1-67'0" AERO 52A

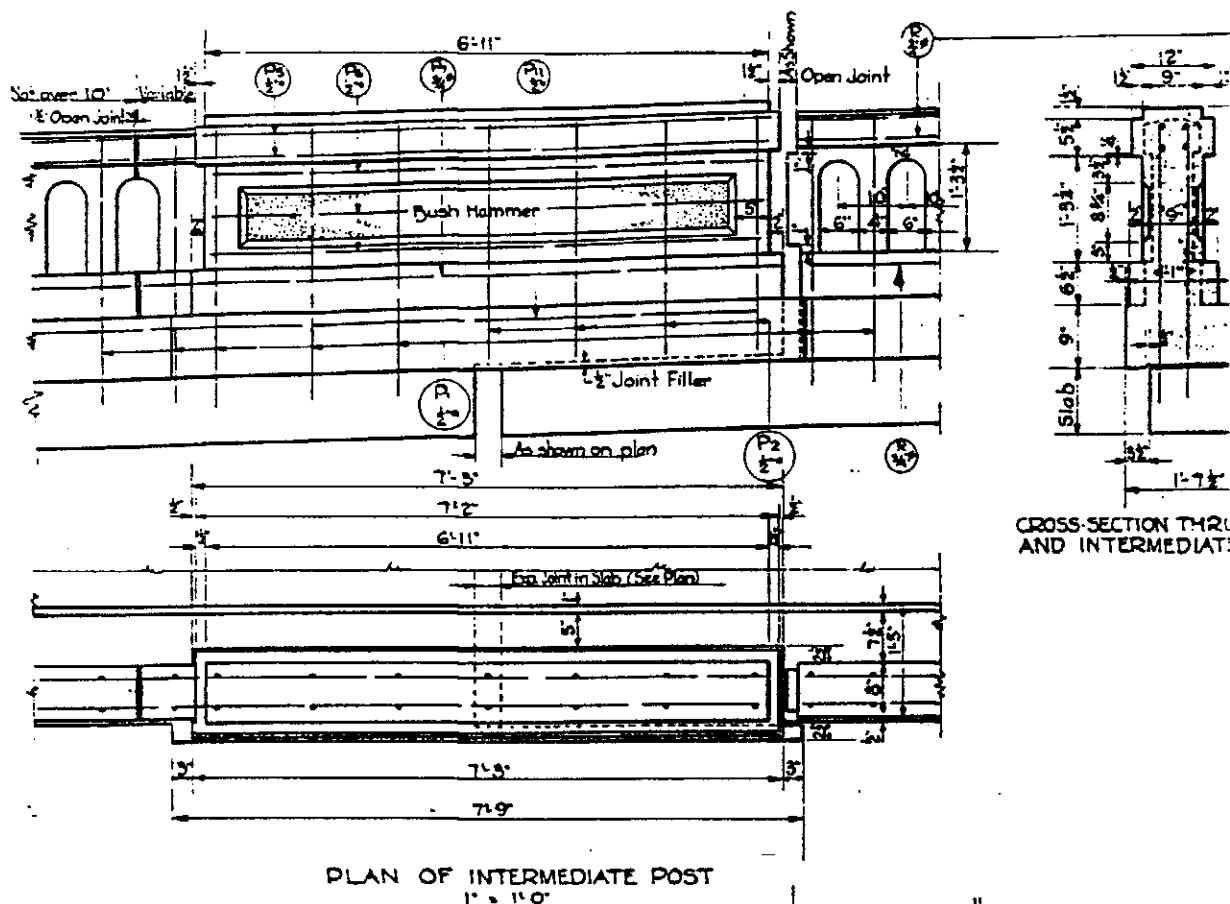
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Normative Berechnung des Werts

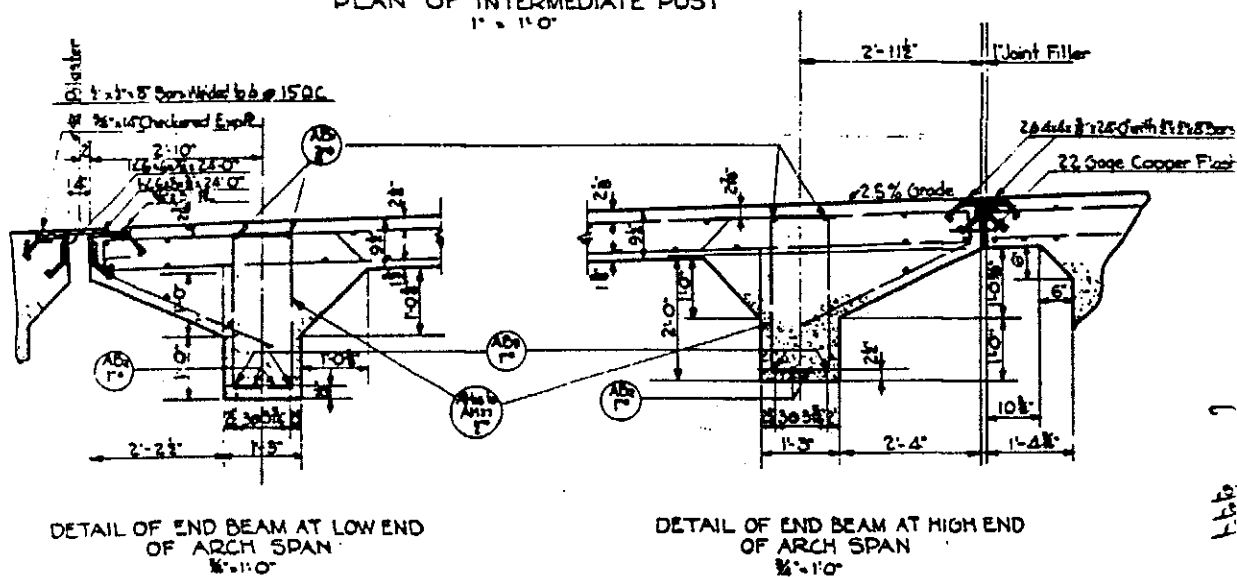
SEARCHED BY P.W.M. INDEXED BY P.W.M.
SERIALS BY P.W.M. FILED BY P.W.M.

SECRET

11-35



PLAN OF INTERMEDIATE POST
1" x 1" 8"

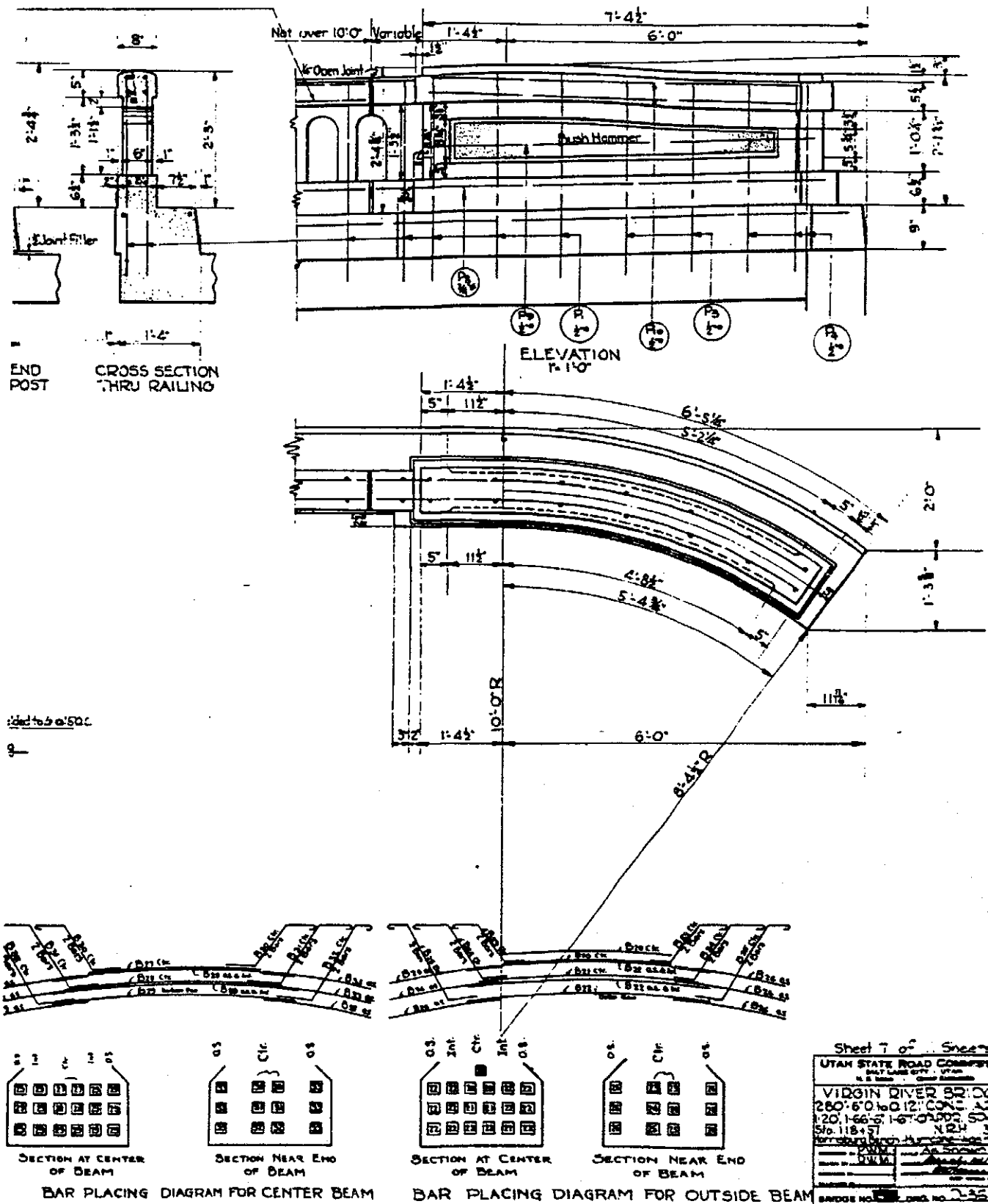


DETAIL OF END BEAM AT LOW END
OF ARCH SPAN.
1:10

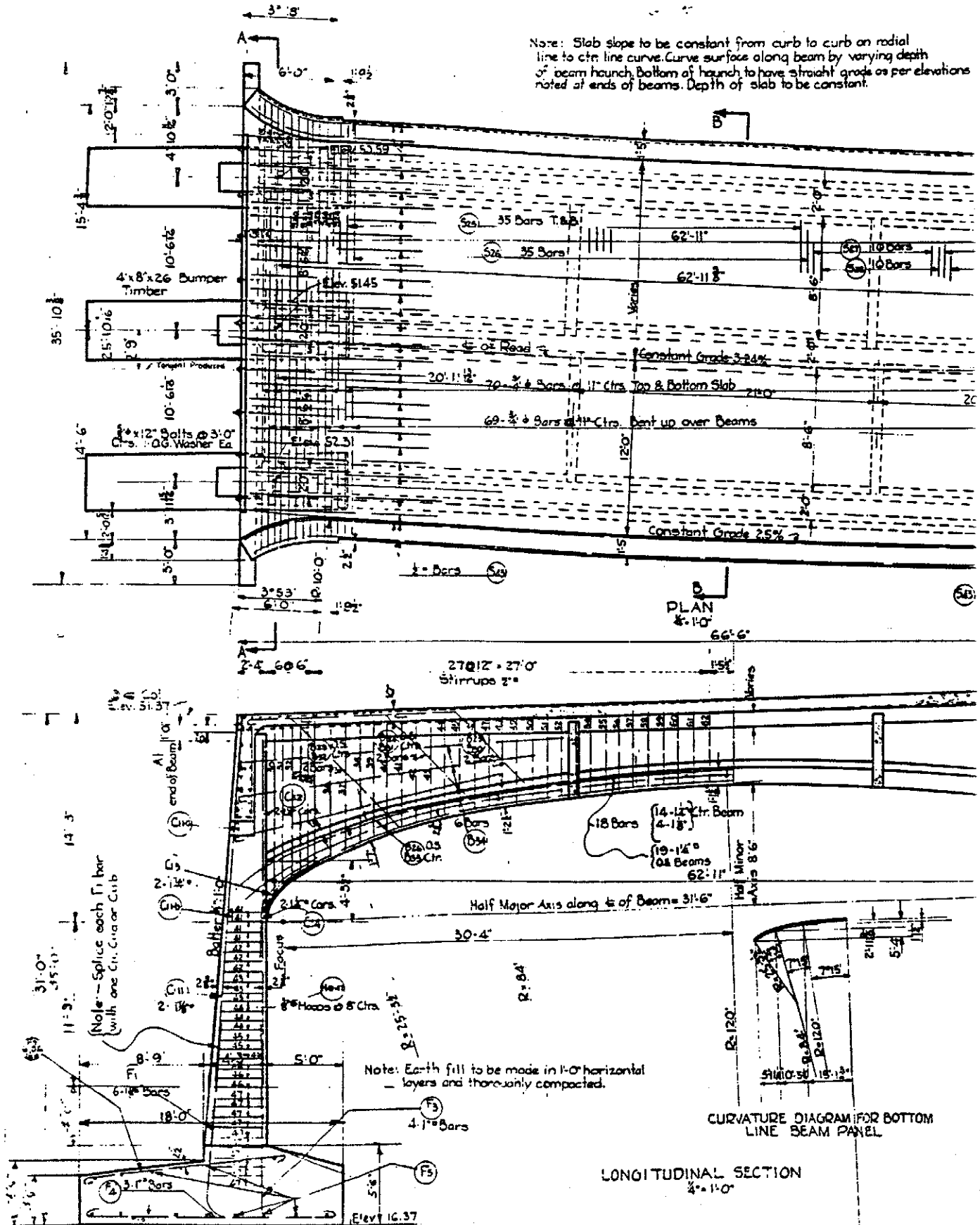
DETAIL OF END BEAM AT HIGH END
OF ARCH SPAN
3'-10"

Note 1- Expansion Angles & Plates
over pier at Sta. 117+29 to be 25'-1" long.

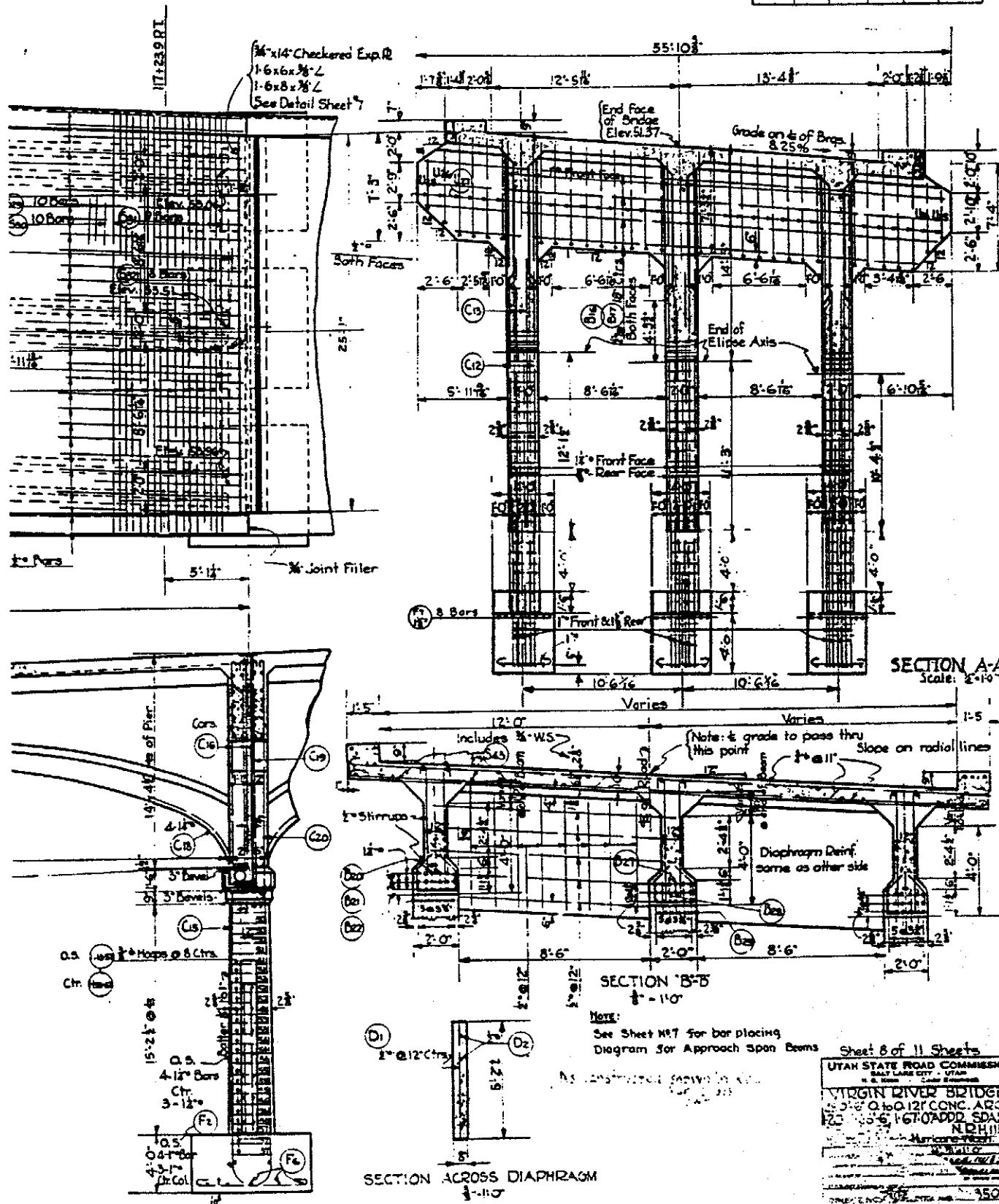
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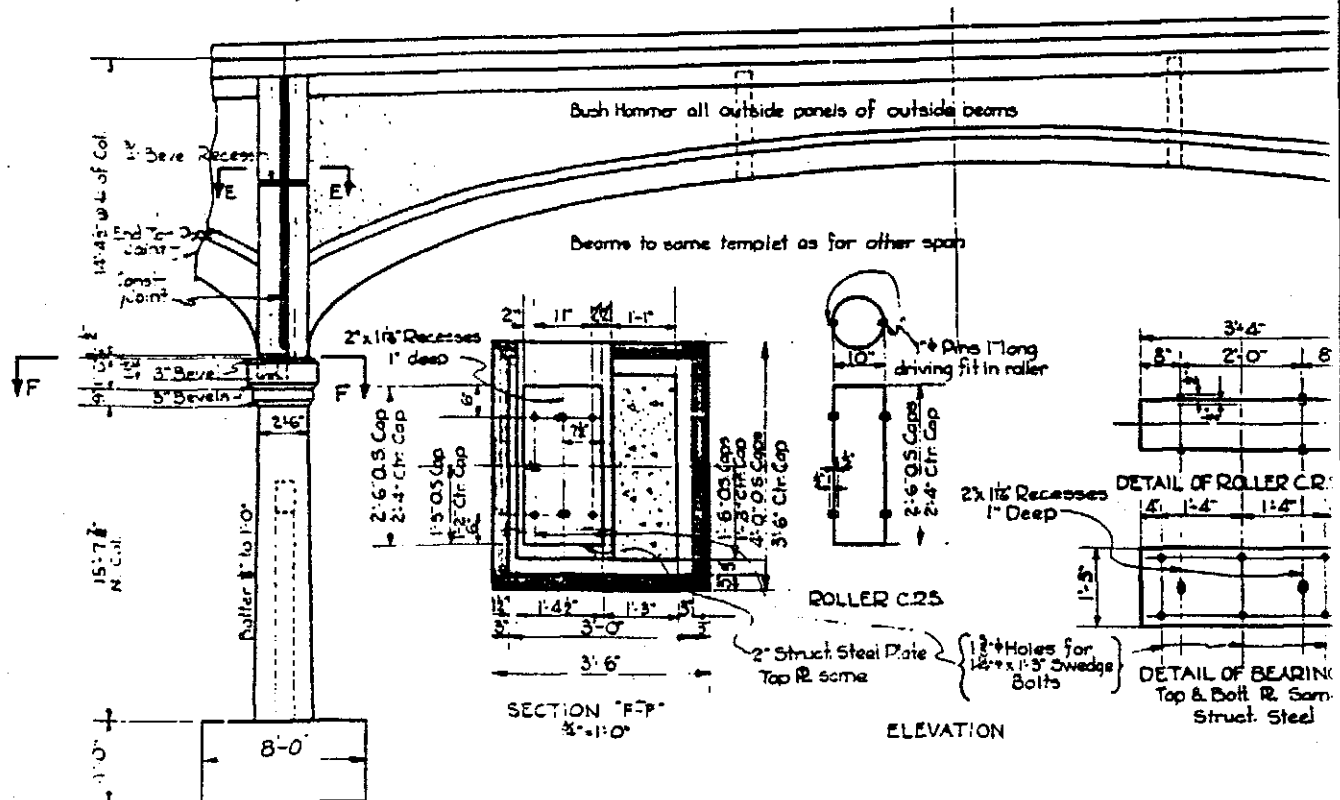
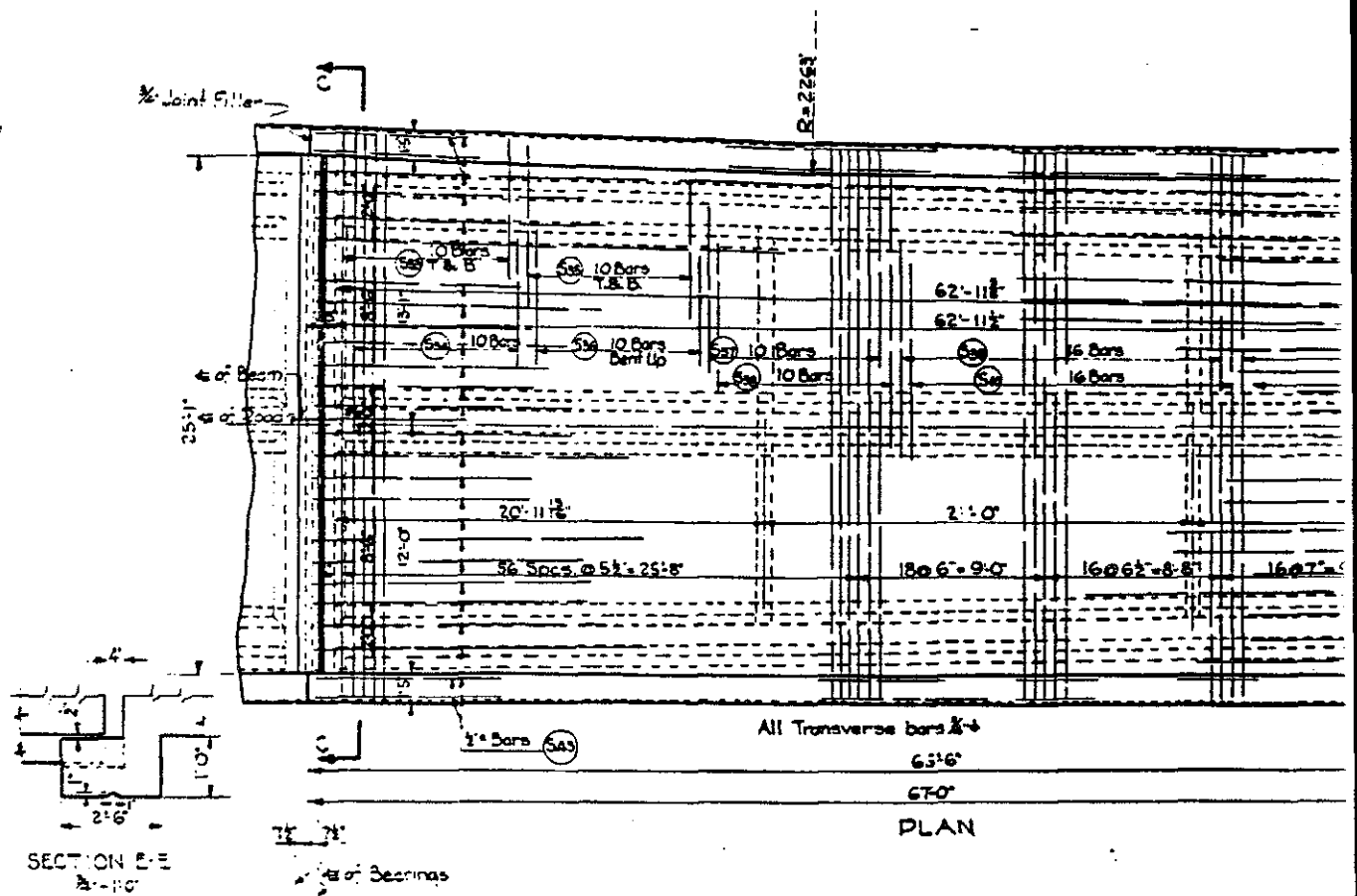


Virgin River Bridge
(Harrisburg Bridge)
HAER No. UT-59
(page 23)

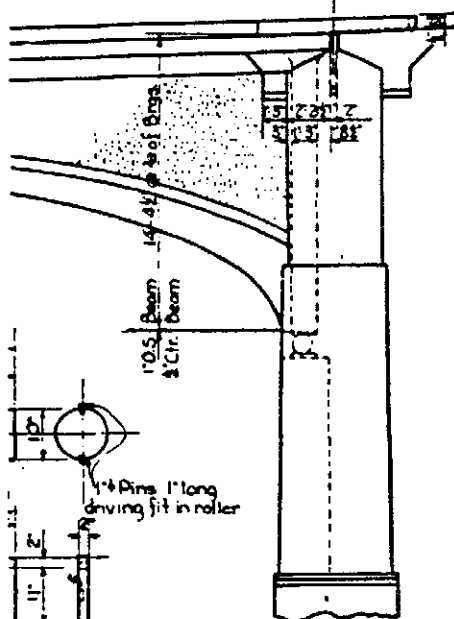


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12	UTAH	1158			

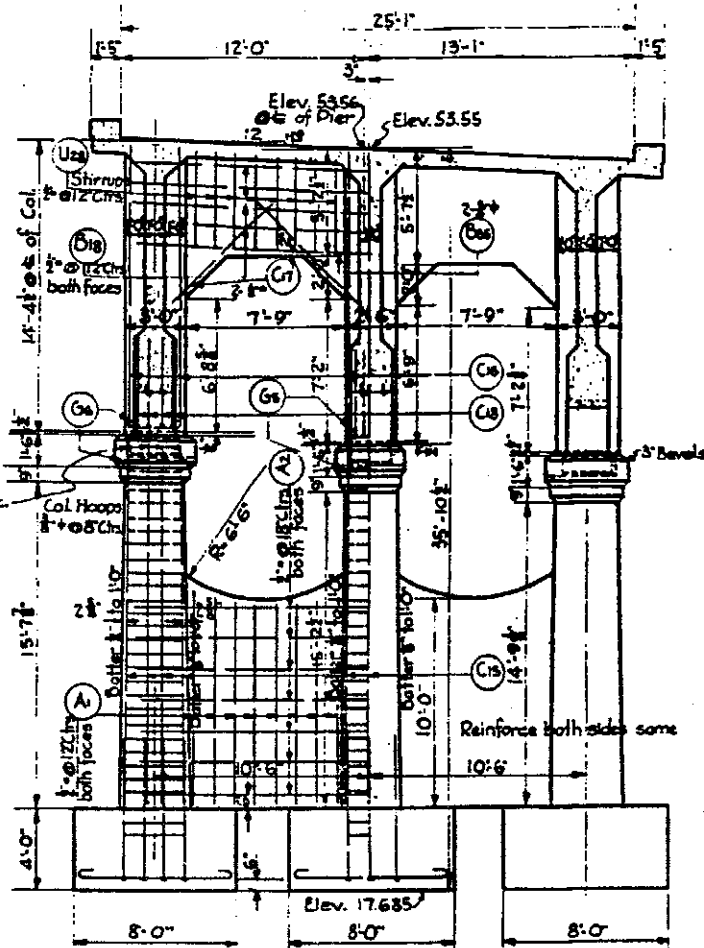




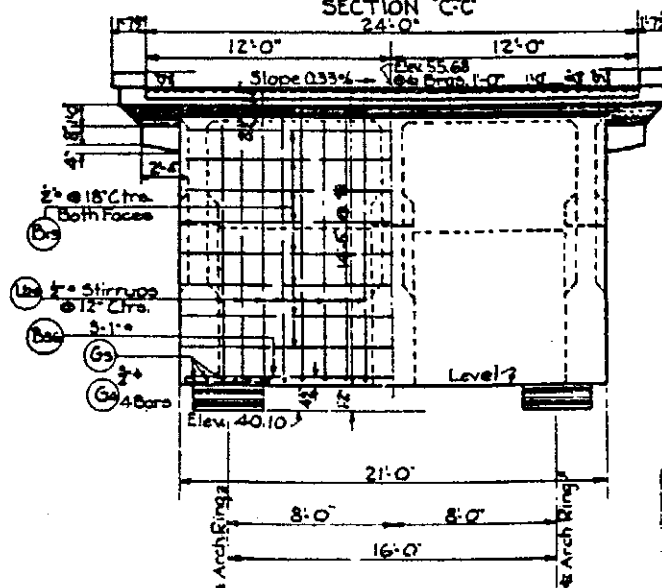
FILE NO.	STATE	REF	FILE NO.	DATE	FILE NO.
12	UTAH	113-8			



1 PLATE



SECTION 7-2-2



SECTION D-D
Arch Deck & Pylon Removed

See detail of bracket
for reinforcing

Sheet 4 of 11 Sheets

UTAH STATE ROAD COMMISSION

SALT LAKE CITY, UTAH
H. B. ELLIS : Chief Engineer

WIDGIN DIVER BRIDGE

282'6" 9 to 0.121' CONC. ARC

66-6167-0 APPD. 52A

11-11-55

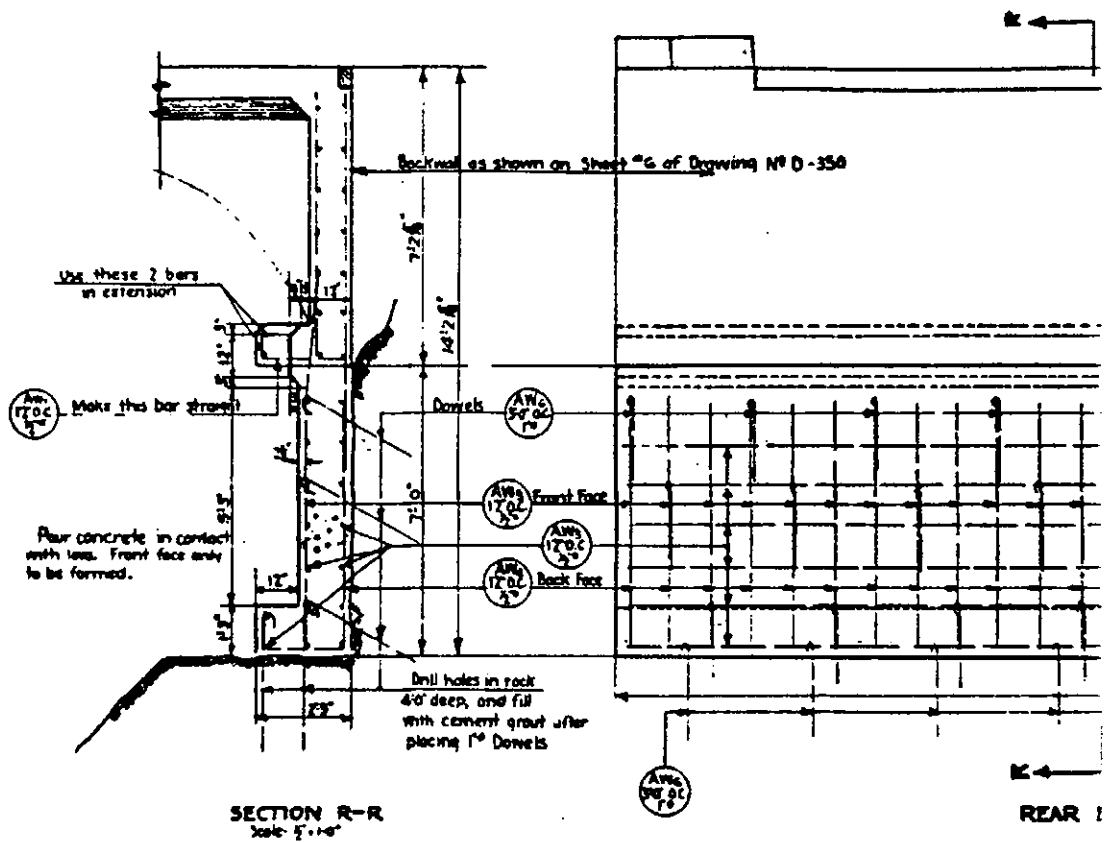
Humana Way
7-105

100-443887-100

DATE: 11/11/11

Page 2 of 2

100

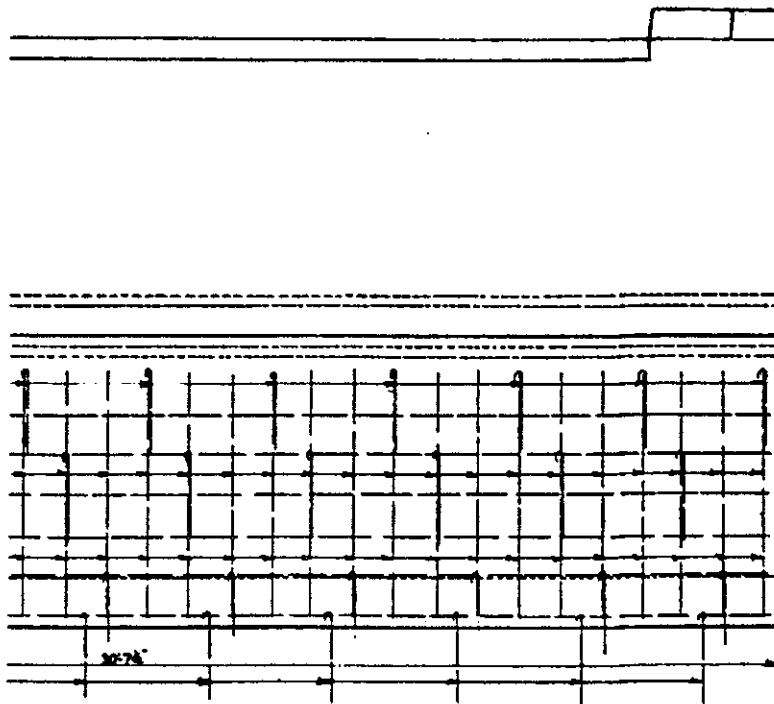


SECTION R-R
Scale 1/2" = 1'-0"

REINFORCIN				
MARK	LOCATION	SIZE	LGTH	NO BARS
AW4	Est. to Backwall	2"	8'-10"	31
AW5	" " " "	2"	8'-8"	31
AW6	" " " "	2"	30'-3"	14
AW6	Dowels	70	6'-6"	51

2 nd Bars	966'0" @ 284°	8
1 st "	323'0" @ 237°	2
	Total	17

State	Project No.	Sheet No.	Scale	Date	Drawn By	Checked By
UTAH	1422	1422				



ELEVATION OF BACKWALL
Scale: 1/4" = 1'-0"

STEEL SCHEDULE

ITEM	SKETCH	QTY
73-10"		
68-8"		
73-6"		
23-0"		

0.76
2.1
2.86

ADDITIONAL QUANTITIES

Concrete	Class A	10 Cu Yds
Cement	Sacks	63
Reinforcing Steel		1703 lbs



Length	Diameter
10'	10"
8'	8"
6'	6"
4'	4"
2'	2"
1'	1"
1/2'	1/2"
1/4'	1/4"
1/8'	1/8"
1/16'	1/16"

ROD NOTES

When holes are called for, the lengths shown on the Total Length column include allowance for holes as shown in above detail. Lengths given in sketches are center to center of end points. All rods to conform to A.A.S.H.O. Spec. All reinforcing bars to be determined.

UTAH STATE ROAD COMMISSION	
SALT LAKE CITY, UTAH	
H. G. Smith - Chief Engineer	
VIRGIN RIVER BRIDGE	
70' Extension - Backwall of 204	
Approximate Span	
Sta. 18+51	P.R.N. 101
Drawn by: H. G. Smith	Checked by: H. G. Smith
Date: 10-1-59	Scale: 1/4" = 1'-0"
BRIDGE NO. 101	